

# Chapter 16 Scientific Revolution

## Reading Questions

1. What were the roots-background- of the Scientific Revolution? How do you explain its emergence?
2. How did seventeenth-century science differ from medieval science? Renaissance science? What was the old Ptolemaic conception of the universe and what did Copernicus, Kepler, and Galileo contribute to the development of the heliocentric theory of the cosmos? What was the reaction of the church to their findings?
3. What do we mean by the Newtonian world-machine? How did Newton arrive at this conception? What are the broader social, political, and cultural implications of viewing the entire universe as a machine?
4. What did Paracelsus, Vesalius, and Harvey contribute to a scientific view of medicine-include chemistry? Be specific and give examples.
5. How did women contribute to the beginnings of modern science? How did male scientists view women and female scientists?
6. What was Rationalism? Why was Descartes considered the founder of “modern rationalism”?
7. Compare the methods used by Bacon and Descartes. Would Pascal agree with the methods and interests of these men? Why or why not?
8. How was the new scientific knowledge spread in the seventeenth century?
9. Why were seventeenth-century European intellectuals so intent on developing methods of study for entire bodies and specific fields of human knowledge? What did it mean then to become a methodical (or systematic) thinker or researcher?

## **DISCUSSION QUESTIONS FOR THE PRIMARY SOURCES (BOXED DOCUMENTS)**

1. “On the Revolutions of the Heavenly Spheres”: What major new ideas did Copernicus discuss in this selection? What was the source of these ideas? Why might one say that European astronomers finally destroyed the Middle Ages? Why were the ideas of Copernicus so controversial? (page 480)
2. “Kepler and the Emerging Scientific Community”: What does the correspondence between Kepler and Galileo reveal about the agents and diffusion of European scientific inquiry? What other notable achievements must European society have reached even to make this exchange of letters possible? What aspects of European material culture made the work of these scientists easier? Why was Galileo initially more cautious than Kepler about publicizing his scientific discoveries? (page 482)
- 3 “The Starry Messenger”: What was the significance of Galileo's invention? What impressions did he receive of the moon? Why were his visual discoveries so stunning and how did he go about publicizing them? Why would these irrefutable discoveries have been so controversial and so threatening to clergymen of all faiths? (page 484)
4. “Newton's Rules of Reasoning”: What are Newton's rules of reasoning? Do they appear “modern”? If so, how? How important were they to the development of the Scientific Revolution? How would following these rules change a person's view of the world, of European religious traditions, and of ancient “science”? (page 487)
5. “Margaret Cavendish-The Education of Women”: What arguments does Cavendish make to defend her right and ability to be an author. (page 491)

6. “The Father of Modern Rationalism”: Describe Descartes' principles of inquiry and compare them to Newton's rules of reasoning. What are the main similarities between these systems of thinking? How might either or both sets of rules for the mind change how individual thinkers thought of themselves, about others, about politics, and about existing systems of European power politics and police of society? (page 494)

8. “Pascal: ‘What is a Man in the Infinite?’”: Why did Pascal question whether human beings could achieve scientific certainty? Does Pascal seem to argue that the Copernican Revolution, with its vastness, was a proof of the existence of God? What does the sheer scale of Pascal's thought (and disquiet) tell you about the impact of the Scientific Revolution on the consciousness and conscience of Europeans? (page 499)

**Identifications:**

1. “God’s handiwork”
2. “Natural philosophers”
3. alchemy and hermetic magic
4. Ptolemaic universe
5. Aristotle
6. geocentric universe
7. empiricism
8. epicycles
9. Nicolaus Copernicus
10. *On the Revolutions of the Heavenly Spheres*
11. heliocentric universe
12. Tycho Brahe
13. Johannes Kepler
14. three laws of planetary motion
15. Galileo Galilei
16. *The Starry Messenger*
17. *Dialogue on the Two Chief World Systems*
18. The Inquisition
19. Isaac Newton
20. *Principia*
21. universal law of gravitation
22. Galen
23. Four bodily humors
24. Paracelsus
25. “new drugs”
26. Andreas Vesalius
27. *On the Fabric of the Human Body*
28. William Harvey
29. *On the Motion of the Heart and Blood*
30. Robert Boyle
31. Antoine Lavoisier
32. Margaret Cavendish
33. Maria Sibylla Merian
34. Maria Winkelmann
35. *querelles des femmes*
36. Rene Descartes
37. *Discourse on Method*
38. “I think therefore I am”
39. Descartes’ deductive method
40. Scientific Method
41. Francis Bacon’s inductive method
42. “to conquer nature in action”
43. Benedict de Spinoza’s pantheism
44. *Ethics Demonstrated in the Geometrical Manner*
45. Blaise Pascal
46. *Pensees*
47. English Royal Society
48. French Royal Academy of Sciences
49. *Journal des Savants*
50. *Philosophical Transactions*